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HIGH ENERGY PULSED PARTICLE ACCELERATOR(U) MICHIGAN  
UNIV ANN ARBOR DEPT OF NUCLEAR ENGINEERING  
R M GILGENBACH 31 OCT 84 N00014-83-G-0157

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		6. PERFORMING ORG. REPORT NUMBER
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9. PERFORMING ORGANIZATION NAME AND ADDRESS Nuclear Engineering Dept. University of Michigan Ann Arbor, MI 48109		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
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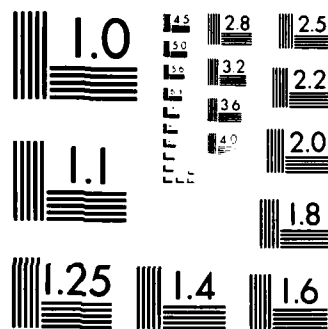
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MICROCOPY RESOLUTION TEST CHART  
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Output (working) Voltage: 1 Megavolt;

Pulse length: Adjustable to 1 microsecond from 0.1 microsecond;

Output Energy: At least 10 kJoules in 1 microsecond within voltage flatness;

Current: At least 10 kA into fixed resistance 100 ohm load;

Voltage deviation from flat top: Predicted to be less than  $\pm 7\%$  voltage fluctuation into variable diode impedance which decreases from 300 ohms to 50 ohms during the 1 microsecond pulse.

Less than  $\pm 5\%$  total voltage deviation into fixed resistance load of 100 ohms.

Unique circuitry was included in the generator to permit electrical compensation for diode impedance droop.

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Office of Naval Research  
Final Report/Publications/  
Presentations/Honors  
for  
1 August 1983 through 31 October 1984  
for  
Contract N 00014 - 83 - G - 0157  
"High Energy Pulsed Particle Accelerator"

R. M. Gilgenbach  
Nuclear Engineering Dept.  
University of Michigan  
Ann Arbor, MI 48109

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Acceptance tests: Less than  $\pm 5\%$  total voltage deviation into fixed resistance load of 100 ohms

Performed at vendor. Generator tested into 127 ohm fixed impedance to demonstrate peak voltage, voltage deviation from flattop, current/delivered energy, pulse jitter, and voltage falltime. Pulser tested into 200 ohm fixed impedance to demonstrate voltage risetime.



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The month of September was spent designing and fabricating electron beam cathodes, anode beam dump and current monitors. Successful electron beam extraction was demonstrated in mid-October. Preliminary results (presented at the 1984 APS Plasma Physics Meeting) demonstrated flat voltage during a ramping current pulse. These initial data were consistent with a diode plasma closure velocity of 2.5 cm/microsecond.

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Faculty/Graduate Students with Research  
Related to this Accelerator

Faculty:

R. M. Gilgenbach, Assoc. Prof.  
W. D. Getty, Prof.  
M. L. Brake, Asst. Prof.  
T. Kammash, Prof.  
R. S. Ong, Prof.  
J. J. Duderstadt, Prof. and Dean

Graduate Students

Tucker, John  
Cheung, Patrick  
Horton, Lorne  
Lucey, Robert  
Cuneo, Michael  
Miller, Joel  
Meachum, Joseph  
Bidwell, Steven  
Smutek, Louis  
Les, John  
Thornhill, Ward  
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### Papers Presented at Scientific Conferences

"Microsecond Electron Beam Interactions with Monatomic and Diatomic Gases," R. M. Gilgenbach, L. D. Horton, M. L. Brake, R. F. Lucey, and J. E. Tucker. Presented at the 26th Annual Meeting of the Division of Plasma Physics of the American Physical Society, October 29, 1984, Boston, MA.

Bulletin of the American Physical Society, 29, 1197 (1984).

### Honors and Awards, R. M. Gilgenbach

#### National:

- 1) Presidential Young Investigator (1984-1989)
- 2) Centennial Key to the Future Award (1984)  
from the IEEE Nuclear and Plasma Sciences  
Society

### Patents

None

### Refereed Journals and Books

None for this accelerator as of October 1984

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